West Texas Oil Town

The HUMBLE WAY

JANUARY-FEBRUARY, 1947

DANGER
NO SMOKING

The HUMBLE WAY

Vol. II JANUARY-FEBRUARY, 1947 No. 5

FOR GREATER EMPLOYEE WELFARE

SHORTLY after January 1, 1947—one year after the effective date of the revised Annuity & Thrift Plan for Humble employees—the Companies paid approximately $1,000,000 to secure two liberalized benefits for eligible participants in the Plan.

First, those in the Plan all last year now have the added benefits of a *five year certain payment* feature made retroactive to cover all annuities they and the Companies bought under the Plan prior to January 1, 1946. This feature is applicable to annuities purchased under the revised A&T Plan and payment of the above-mentioned sum makes the five year feature applicable to annuities purchased under the old A&T Plan. *Second*, Humble has bought each veteran or employee in government service during World War II, who was a participant when he entered service, an amount of annuity covering the time he was away.

The five year certain payment feature makes the Humble Annuity & Thrift Plan considerably more liberal and attractive. It simply means that the annuitant or his beneficiary will receive monthly payments for at least five years after the annuitant's retirement. For example, if the annuitant lives only three years after retirement, his beneficiary will receive the usual payments for another two years. That is a marked liberalization of the old A&T Plan, under wihch normal annuities stopped when the annuitant died, whether death came one week or ten years after retirement. (Exception: The annuitant could choose the joint-and-survivor annuity, which guaranteed his beneficiary lifetime payments, or he could choose the cash refund annuity, which would guarantee him or his beneficiary the return of his own annuity contributions and interest. These special types of annuity payments, of course, would be considerably less than the normal regular payments.)

A participant in the Plan who entered military or government service during World War II and returned to work with Humble, will get the benefit of the retroactive five year certain payment—if he re-entered the Plan within 31 days after coming back to work and stayed in the Plan one full year. For such participants who re-entered the Plan within six months after returning to Company service, the Companies have bought an amount of annuity corresponding to the time they were away. These purchases have been made on the basis of the employee's earnings at the time he entered military or government service. They include not only the amount of annuity the employee would have bought with his earnings, but also the amount that would have been bought with Company contributions.

Here are some important facts about the five year certain payment feature as applicable to normal annuities purchased under the revised Plan: *Within 18 months* after his retirement at normal retirement age, the annuitant or his beneficiary will get back all the money he put into the Plan. Thereafter annuities paid to him during his remaining lifetime or to his beneficiary during the five year guarantee period will be bought with Company contributions and interest earned. In other words, the Plan guarantees that the retired employee or his beneficiary will get back *at least $10 for every $3* he puts into the revised Plan.

A per-capita breakdown of the additional million dollars Humble recently invested in employee welfare shows that the Companies paid an average of about $46 to get each eligible employee the five year certain payment coverage on the old A&T annuities. An average of about $430 was contributed to buy annuities for each eligible employee in military or government service. Thus, Humble paid an average of about $476 into the individual account of each employee who qualified for both benefits.

CLOUDS OF STEAM rising from the open hatches of barges being cleaned before loading seem to contradict the positiveness of the warning sign.

MISSISSIPPI RIVER FOG SHROUDS BARGES AND TANKER BEING LOADED WITH PETROLEUM PRODUCTS AT BATON ROUGE

When OIL *and* WATER *Mix*

Movement of petroleum and refined products on the Gulf Intracoastal Waterway increasing

A FEEBLE January sun was trying to break through the swirling fog that hung over the Mississippi River at Baton Rouge. Upstream the twin stacks of a river steamer floated mysteriously above the mist, the boat below completely invisible. Downstream a chance shaft of sunlight caught the gray hulk of a tanker at anchor, awaiting its turn to load. Alongside the dock a busy tug had just worried its tow of barges into place and already black lines of hose connected them to the shore.

Baton Rouge is a crossroads on an important oil-water highway—the Gulf Intracoastal Waterway. From here, big stern wheelers push loads of ten or twelve giant barges of petroleum products as far north as Pittsburgh, Chicago, and St. Paul. From here, tankers, their decks almost awash, slip downstream into the Gulf and around Florida toward the eastern seaboard. Past Baton Rouge float long tows of line pipe and drill stem headed for the oil country of lower Louisiana and Texas. To the Baton Rouge docks come the shallow-draft canal tugs, towing two or three barges of crude oil, base stocks, or intermediate products. On the return trip the cargo is asphalt, gasoline, or lubricating oils for destination both east and west of the lower Mississippi River.

Twenty-two miles downstream from Baton Rouge and on the right-hand side of the river are the Plaquemine Locks, oldest gateway to the western section of the Gulf Intracoastal Waterway. The construction of the locks at Plaquemine and of a waterway from Plaquemine to Grand Lake, Louisiana, was authorized by Congress in 1895. The Plaquemine Locks, like those at Harvey, 112 miles down the Mississippi, take care of the difference in elevation between the river and the canal.

Plaquemine Locks were only partially complete in August, 1905, when there was held in Victoria, Texas, a meeting

destined to be of great importance to the entire Gulf Coast area. This meeting was called by the late C. S. E. Holland, president of the Business Men's Association of Victoria, who wrote, "The object of this convention is for the purpose of discussing the feasibility, plans and construction of an intracoastal canal from Brownsville, Texas, to Donaldsonville, Louisiana.

More than 200 delegates attended the meeting, among them, John Nance Garner, later Vice President of the United States. From the meeting the Intra-state Inland Waterway League of Louisiana and Texas was formed, later to become the Intracoastal Canal Association of Louisiana and Texas. For more than 41 years the association has remained active, fostering first the idea and later the actuality of an intracoastal waterway from the Rio Grande to the Mississippi.

In 1905, Congress authorized the preparation of preliminary plans on just such a waterway, and, by slow stages, the project began to materialize. Eventually a channel five feet deep and forty feet wide at the bottom threaded the shallow inland bays of coastal Louisiana in broken sketches between the Mississippi and the Sabine Rivers. In 1909, Plaquemine Lock was completed and a a navigable waterway from the Mississippi to Morgan City was opened. In the same year, Congress authorized a survey for a continuous waterway eastward from the Mississippi to St. George's Sound, Florida, and subsequently authorized work on this stretch of the channel. By 1925, when the Harvey Canal and Locks at New Orleans were acquired, there existed a continuous waterway from the Sabine to the Mississippi five feet deep by forty feet wide.

The Intracoastal Canal Association in October, 1922, adopted a resolution to petition Congress for a canal nine feet by one hundred feet from the Mississippi River to the Rio Grande. Congress authorized a survey for such a canal in March, 1923, and about that same time, the Association retained General George W. Goethals, of Panama Canal fame, to study the economic possibilities of the project. The general's report of a potential 6,000,000-ton annual movement through the canal, combined with a favorable engineering survey, was reflected in the Rivers and Harbors Act of March, 1925, and January, 1927. These acts authorized the construction of the Louisiana and Texas Intracoastal Waterway, a nine by one hundred foot channel to extend from the Mississippi River to Corpus Christi. The channel was completed as far west as Galveston by August, 1934.

Little work was done on the section between Corpus Christi and Galveston until 1939. In that same year a proposal was introduced in Congress to enlarge the entire channel from Louisiana to Corpus Christi to a size of 12 feet by 125 feet. In the meantime a nine foot by one hundred foot channel had been developing eastward from the Mississippi and by 1938 had reached Apalachicola, 357 miles east of the Mississippi. This was the status of the Gulf Intracoastal Waterway when war came to America.

The urgent need for inland water transportation of vital war supplies, safe from the submarines that began to prey on coastwise shipping, became apparent early in the war. The 9 foot by 100 foot waterway was completed to Corpus Christi in April, 1942, and in June of that same year Congress authorized the enlargement of the Intracoastal Waterway from Carrabelle, Florida, to Corpus Christi, Texas, to a depth of 12 feet and a width of 125 feet, and, furthermore, authorized that this channel of the same dimensions be extended south to Brownsville. This was the realization of a dream 37-years old, and with it came the challenge of moving a large part of the nation's wartime petroleum supplies. The Intracoastal Canal met the challenge.

Movements of petroleum and its products became almost entirely from west to east. New barges and tugs were put into operation. The government through the Defense Plants Corporation, began the construction of 20 river tow boats and 168 steel barges with a capacity of 9,500 barrels each. Private operators on the canal, of whom there were about 100 at the beginning of the war, redoubled their efforts with the equipment at hand to move the oil and vital products eastward.

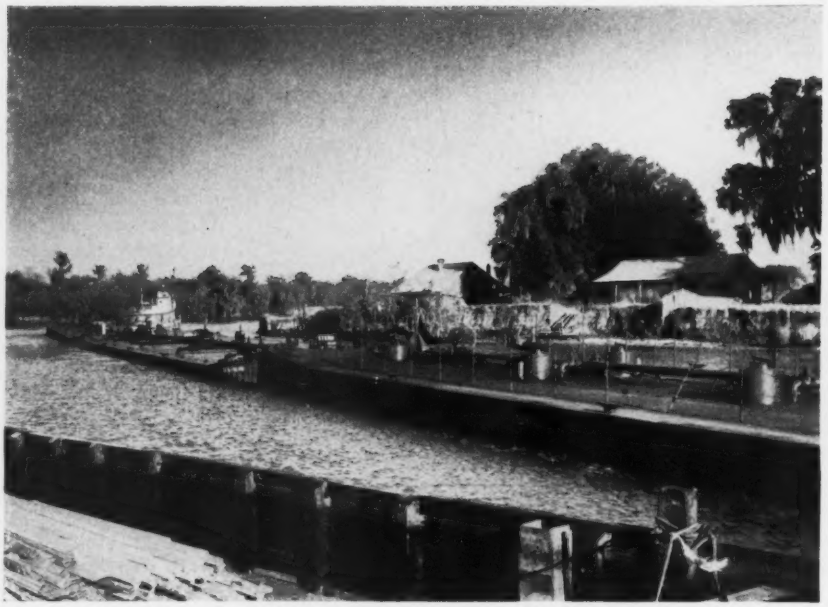
The Plantation Pipe Line at Baton Rouge received some 40,000 barrels of petroleum daily by way of the Intracoastal Canal. The Southeastern Pipe Line, with its origin at Port St. Jo, Florida, was supplied with an average of 25,000 barrels daily. Early in 1943, the Trans-Florida Pipe Line was completed, connecting the eastern end of the Gulf Intracoastal Waterway with the Atlantic Intracoastal Waterway. To supply this line, 20,000 barrels of oil were brought in daily by a fleet of some 20 tugs and 60 barges.

In addition to serving as feeders for the pipe lines, the Intracoastal tugs and barges moved over 700,000 barrels of refined products monthly from the Houston-Texas City, and Beaumont-Port Arthur areas to distribution points up the Mississippi River and its tributaries. Aviation and motor gasoline, residual fuel oils, special lubricants and solvents moved up the waterways to important war industries centers of the middle west and east. Toluene from Humble's Baytown Ordnance Works moved by water to explosive manufacturers. Butadiene and synthetic rubber took the water route to their final processing.

By 1944, tonnage moved on the canal, which was originally intended

A BIG OIL barge that nearly fills the Plaquemine Locks is inched out into the river.

A CANAL TOW slides past stately live oaks and picturesque cabins near Morgan City.



to carry 400,000 tons annually, and for which General Goethals had predicted a maximum annual tonnage of 10,000,000 tons, approached 20,000,000 tons. Of this volume, 14,500,000 tons were moving eastward in the Galveston-New Orleans area, the total movement on the Texas portion of the canal being 17,500,000 tons. On the eastern section from New Orleans to Carrabelle, Florida, nearly 18,000,000 tons were moved. And 90 per cent of this tonnage was petroleum and its products.

The development of the Intracoastal Waterway and the growth of the oil industry in Texas and Louisiana have paralleled each other remarkably. Each has contributed to the development of the other and together, oil and water performed a notable war job.

The largest present-day movement of petroleum products through the Intracoastal Canal consists of finished goods moving from refining centers along the Gulf Coast to consuming areas elsewhere within the United States. But the canal is also the means by which great quantities of crude oil produced in distant localities reaches the refineries. From Humble Pipe Line Company's Harbor Island terminal crudes collected from the West Texas fields are barged into the Houston and Beaumont areas. Some crudes travel from the Houston-Texas City area to refineries in Louisiana.

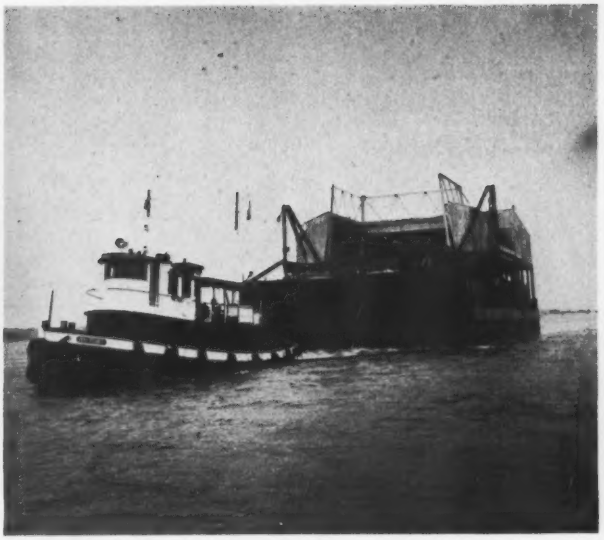
Through the coastal country of Louisiana where any method of transportation other than by water is completely impractical, the canal serves as a broad highway into which feed the many winding bayous of the Louisiana swamp country. Tugs pull single barges up these snaky channels, pick up the crude from lease tanks perched above high water on the banks. The bayous serve as a gathering system and through the main line of the canal the production of many of these coastal wells reaches the refineries.

The canals serve also as the highway down which move the launches, barges, and quarter boats carrying geophysical exploration crews. Through the canal also come big submergible drilling barges and attendant boiler barges. Later, cementing trucks and cargoes of drilling mud come down the canal to the channels which lead into the swamps and to the drilling locations.

As a water highway between points

THERE ARE STRETCHES OF OPEN WATER ON THE INLAND WATERWAYS WHERE TUG AND TOW CAN KICK UP BOW SPRAY

FLOATING PIPE RACKS of marsh drilling operations are the barges on which drill stem and other materials reach the site.



THROUGH THE CANAL and up narrow channels to the drilling location tugs move submergible barges, complete with derricks, boilers.

otherwise inaccessible, the importance of the canal can be realized by examining the records of *internal* traffic—that which moves between points on the canal. During 1945 one million and a half tons of crude petroleum moved internally. A million three hundred thousand tons of gasoline, kerosene, naphtha, benzol and asphalt; 800,000 tons of fuel and residual oil; 54,000 tons of lubricating oils and greases; even 19 tons of paraffin wax are listed in the annual figures for 1945.

The list of *through* traffic—traffic that moves through the canal but is neither loaded nor unloaded on the canal itself—included more than 2,500,000 tons of crude petroleum; nearly 3,000,000 tons of petroleum products, including alkylates, benzol, gasoline, and others; over 1,000,000 tons of fuel and residual oils; 58,000 tons of lubricating oils and greases, and over 32,000 tons of pipe. More than 300 tons of well drilling machinery and 800,000 tons of oil well supplies passed through the canal during 1945.

All together, the 1945 records, which are the latest complete figures available, indicate that nearly 16,000,000 tons of goods passed through that portion of the canal from Corpus Christi to the Mississippi. To speak in almost astronomical terms, that means more than six billion ton-miles of freight. The figures for 1946, not yet complete, indicate an increasing movement approaching the peak war year of 1944.

The full potentialities of the Gulf Intracoastal Waterway are beginning to be realized and the canal is not even complete. Although already over 100,000,000 cubic yards of material have been moved, and over $14,000,000 spent on that portion between Corpus Christi and the Sabine River, $11,000,000 will be required to complete the extension to Brownsville and for other tributary channels. When complete, the canal will extend from the Mexican border to Jacksonville, Florida, a distance of 1260 miles, and will connect many land locked cities to the sprawling inland waterway system that is one of the nation's great assets.

Already the Gulf Intracoastal Waterway has had a profound influence on the industrial development of the country which it traverses. And the products of the country have had a definite influence on the growth of the canal. Together, Gulf States industries, resources, and waterways form a successful combination that is certain to become more and more important in the future economic life of America.

AT BAYTOWN DOCKS, a barge is moved into position for loading with petroleum solvents.

REWARD *for Thinking*

Employee writes letter to tell of Coin-Your-Ideas windfall and to explain inner workings of Plan

Dear Mom and Dad,

Congratulate me, folks! I'm in the money—fifty dollars, to be exact.

Just like a bolt out of the blue, too, the boss called me in, along with four other men in our department, and began to make a little speech. He said we're the type of people who think on the job; who see what can be done and have the initiative to do something about it; plus a lot of other nice things—ending up with the statement that we were contributing to the building of a spirit of helpfulness and cooperation between employees and management.

While I looked around the room to be sure I was in the right place, he pulled out these checks, see, and said something about the Central Coin-Your-Ideas Committee of the Humble Companies, and first thing I knew, there in my perspiring hand was $50.

Immediately, before I could stop myself, I began thinking of that week-end fishing trip Dad and I planned to take, the new reel he needs, a new tire for my car, my bill at the tailors . . . but of course I haven't inherited a fortune. I do feel like it, though.

At any rate, I began to see the light—it all comes about through Humble's Coin-Your-Ideas Plan.

That's a plan whereby if an employee has an idea which brings about improvements or increases efficiency in Company operations, he can submit it through the proper channels, and if judged to be workable and it is accepted, he'll get what they call an initial award. That can be anywhere from $5 to $100, depending on its merits. (That's what mine is, an initial award.) But, that's not the end of things. After my suggestion is in use for a full year from today, it's eligible for what they call a supplemental award, which, of course, is based on a revaluation of my suggestion. That is, if it proves to be better than originally determined, they can award me any amount up to $1,000, depending on just how good they find it to be.

That still isn't all.

The second year after I've received my initial award, my idea can compete for what they call a capital award. They just make five of these awards in any given year, and one is given in each of these departments—refining, producing, sales and general, including the Houston office, and one for Humble Pipe Line Company. These capital awards are granted each year for the most meritorious suggestions, of the second preceding year, which have been in use at least one year prior to January 1 of the year they are considered for a capital award. (I quote this from the Coin-Your-Ideas Manual.) They can be as much as $500. That makes it possible for one idea to net an employee $1,600 top money. They say there are several employees who have gotten this top money for ideas submitted.

The beauty of the Plan is that these ideas don't have to be fancy and complicated, though some are. One of the men in our section got an award for perfecting some kind of a little gadget that only a scientist would understand, while one of the girls in the steno section won her cash with an idea which anybody would understand—simplification of a form that has been in use several years and will save a lot of extra time and work.

Too, the supervisors are always eager to help anybody who wants to submit an idea to the Coin-Your-Ideas Committee. (And, by the way, these C.Y.I. Committees, local ones — of which there are ninety—and the Central Committee, are all made up of our fellow employees, and you never saw any bunch bend so far in an effort to shoot fair and square with everybody.)

Remember when Fred, my roommate, was teasing me about the "plans" I was drawing to submit with my idea? He said they looked like a Rube Goldberg concoction to him, and the folks at Humble probably would think there was a screw loose somewhere. Well, I'm no finished draftsman, but the boys on the Committee understood, and it got the idea across good enough to net me $50!

And speaking of that fairness in administration, there's one policy that strikes me as being the height of square shooting.

Paying twice for one idea, in the interest of fairness, is an established policy of the C.Y.I. Plan. For example, if a man submits an idea that isn't considered practical at the time, and if a year or so later another man suggests the same idea at a time when it is practical—both men may be eligible for awards.

Too, they tell me the Patent Committee of the Company reviews all Coin-Your-Ideas suggestions to provide a mechanism for the handling of patentable suggestions of employees who are not included in the groups which assign their inventions to the Company. Then, if the Committee finds an idea is patentable, the person who submitted it is given the choice of either going ahead and trying for a Coin-Your-Ideas award or withdrawing it from that plan and having it patented. If he takes the latter course, all costs of taking out a patent are borne by the Company, and the employee receives royalties from the sale of the product, except when it is used by Humble and affiliated companies.

They make these Coin-Your-Ideas awards four times a year, and at the end of the first quarter of the year, they announce the capital awards. My $50 was a part of the 62 initial awards made for the last quarter of 1946. These, plus three supplemental awards, totaled $1,850, boosting the total amount awarded for the whole year to $14.215.

Making the awards for the last quarter of 1946 wound up the 15th year of the Coin-Your-Ideas Plan in the Humble Companies. And has this plan grown! In these 15 years, 2,965 employees of Humble Companies have received awards, totaling $74,013, for devices and ideas which they have developed to increase operating efficiencies, reduce costs, or insure greater safety in their work.

Since the Coin-Your-Ideas Plan was started in June, 1931, cash awards and employee interest in his job have furnished the incentive which has kept it growing constantly since that time. Many a cash windfall (like mine received today) has been the reward to enterprising Humble employees for worthy ideas.

The records show the very first Humble Companies C.Y.I. award went to Jack McNamee, a pumper in the McCamey production district. He got $25 for an idea regarding a wolf pumping and flow packer (whatever that is). He turned in the idea in December, 1931, and the award was made in January, 1932.

At that time the Plan provided for an initial award of from $5 to $75, and in addition to that, four capital awards of $100 each were made for the best suggestions submitted during each year for each of the three major departments—production, refining, and sales—and one for Humble Pipe Line Company. No provisions were made for supplementary awards. This plan was used until August of 1938, when the first liberalization became effective, meaning more prize money was offered.

Under the liberalized plan there was provided an initial award of from $5 to $75, and the supplemental award was added, this award not to exceed $250 minus the amount of the initial award. The capital award was boosted from $100 to an amount not more than $500, with these awards going annually, one each to refining, production, sales, general, and Humble Pipe Line Company employees.

Interest bounded. From an average of about 35 awards made every year from 1932 until 1938, the figure jumped to an average between 200 and 250. Total annual prize money presented rose from $560 average to between $2,000 and $3,000. On April 10, 1944, the plan was liberalized once more. Now, as I explained, it is possible for an employee to get as much as $1,600 for one idea.

These boosts in award money certainly cause more interest in the C.Y.I. Plan. In 1945, there were 529 awards, totaling $12,860 in cash, and, as I've already told you, 1946 was the biggest C.Y.I. year yet at the Humble Companies.

In fact, here at Humble, we employees are realizing more all the time that fairness in administration, promptness in handling all suggestions, and certainty of a real reward for any idea considered to be of value makes it worthwhile to coin our ideas.

My boss says Humble's C.Y.I. Plan is something of a pace setter—especially in the petroleum industry. In fact, he explains, that the movement—not only to let the employees have a say-so in suggesting improvements in the company's operations, but to pay them for their ideas—is a mere baby in industrial thought.

It was just about the time of World War I that some of the large United States manufacturing companies started what then was a revolutionary idea—to reward their employees for telling them what was wrong and what to do about it.

The idea was picked up quickly by the new oil industry, where it has flourished with the greatest success, and today there are some 6,000 such Coin-Your-Ideas award plans throughout United States industry. There are probably more in the oil industry than in any other.

Evidence that Humble is a leader in the field are the numerous requests from many leading companies for copies of Humble's C.Y.I. Plan and procedure.

Now, you understand I could write on at length about all the merits of turning ideas into cash, especially here at Humble, but I think I'll get busy and work out details on another idea I've been toying with for a couple of weeks.

You see, there's no limit to the number of ideas I can turn in, nor to the number of awards I can receive for ideas that are adopted. A few of the men pride themselves in having an award in nearly every quarterly announcement. Some have pocketed hundreds of dollars over the years as a result of their ingenuity.

With this $50, I make my start. Wish me luck—and, Dad, you can begin to think seriously about that fishing trip!

Your loving son,

Richard

CENTRAL COMMITTEE of the Coin-Your-Ideas Plan meets quarterly in Houston. Members, l. to r.: J. E. Niland, Sales; J. W. Holtz, Humble Pipe Line Company; Dr. E. F. Voss, Refining; F. A. Watts, Chairman; R. B. Roaper, Safety & Training; and Douglas Ragland, Production.

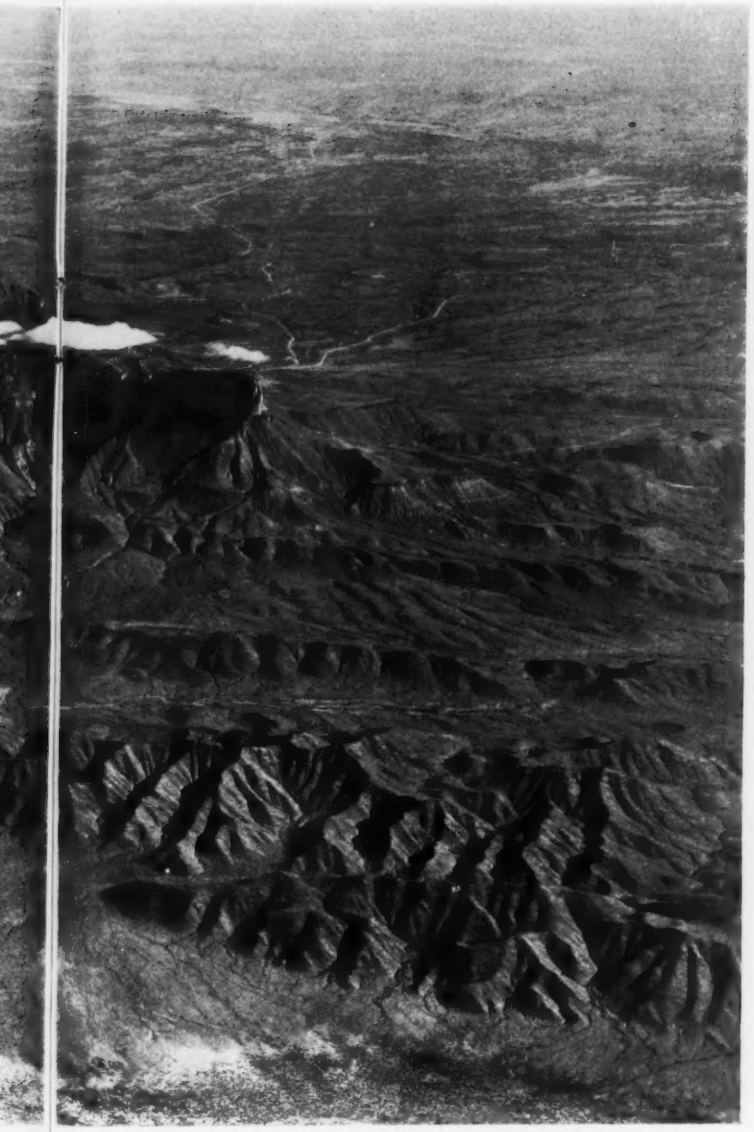
The Permian Basin

Most extensive oil producing region in the United States

THE Permian Basin, embracing 35 counties in western Texas and southeastern New Mexico, covers an area of more than 46,000 square miles and contains 262 oil fields whose 23,000 producing wells have yielded a cumulative total of two billion and 390 million barrels of oil in the past 25 years.

That is a quick picture of the most extensive oil producing area in the United States today.

Twenty-five years ago the scene was quite different. Then the Permian Basin contained the same number of counties. the same total area, and the same rugged and varied terrain. But 25 years ago the area was one vast pasture, grazing cattle and sheep. There were small sections in which dry land farming produced cotton and feed, but to the greater part of the 78,000 people who inhabited the trackless sand dune areas, the flat prairies, and the ranges of tall gray hills, lightly peppered with green cedar clumps growing on their sides, the region simply meant ranching. It meant windmills and fences to repair; it meant coyotes and rattlesnakes; it meant roundups and sheep clipping time; it meant miles to the nearest neighbor and long drives over none-too-good roads to market; it meant a lonely life in a sparsely settled country —satisfying to those who chose it, uninteresting and forbidding to others.



GUADALUPE POINT (El Capitan) in Culberson County is one of the keys to the geology of the Permian Basin to the east and northeast at upper right. The reef-like formation at the summit of the 8,751-foot Guadalupe Peak dips downward sharply in those directions and about 100 miles distant becomes the source of much of the oil in the productive Central Basin Platform fields.

Then oil was discovered!—at a time when the word oil was magic even though Texas already occupied a prominent place in the world oil picture.

New people came; a new way of life began developing. Oil companies moved in drilling and producing personnel and erected comfortable and permanent housing facilities for them. Equipment and servicing companies built distribution centers. Pipe lines were laid and pumping stations and storage tanks mushroomed. Communities grew up around the oil fields and highways were laid to connect the fields and the communities. Population figures mounted rapidly, and it was a solid gain. People who came stayed and helped to develop this former range area into a sturdy new empire—important in the oil world, important still in the world of sheep and cattle, and important as progressive, forward-looking sections of the neighbor states of Texas and New Mexico.

The area's population of 78,000 in 1920 grew to 255,000 by 1940, and reliable estimates today place the figure at approximately 300,000. To illustrate by example: Ector county was inhabited by 760 people in 1920, according to U. S. Census figures; by 1940 the figure had grown to 15,051; and today the county seat alone, the town of Odessa, has between 30,000 and 35,000 inhabitants. Midland county's population stood at 2,449 in 1920; today the city of Midland has 18,000 residents and the county in excess of 20,000. The examples could be continued county for county, because with succeeding oil discoveries new communities were established and the older ones kept pace with the greater prosperity resulting from expanded development of petroleum resources. And they are solid communities—proud of their progress and confident of their future.

For a full understanding of the region in which such expansion and progress has taken place, a geographic bird's-eye view is important. The Permian Basin actually begins in Kansas and extends through portions of six states. To oil people, however, the area of primary importance is made up of two counties in southeastern New Mexico and 33 counties in western Texas—an area slightly greater than the state of Pennsylvania, birthplace of the oil industry. Roughly, the Basin extends from Sweetwater, Texas, on the east to Artesia, New Mexico on the west; from Hall county on the north to central Pecos county on the south.

Even more significant than the geography is the geology of the area, for the latter explains the presence of the almost incredibly large deposits of oil. Since geologists speak in terms of millions of years, a review of the past 250 million years in the geologic history of the Permian Basin should prove interesting.

In the distant past, known as the Pennsylvanian era, geologists reconstruct the Permian Basin as an area entirely under water—covered by a desiccating, or gradually disappearing sea. A chain of mountains known as the Llanorians existed in approximately the same area occupied by the oil-field studded Central Basin today. During the 150 million years between the Pennsylvanian and the Woodbine periods these mountains were worn down by the winds, the streams, and by weathering to a gently rolling plain not very high above sea level. By the time we reach the Woodbine age of 100 million years ago the Basin area was a flat peninsula of land, covered by a blanket of young beds of sand, clay, and limestone, and surrounded on the west, south, and east by water. No mountains were then in evidence and the land was probably covered with luxuriant vegetation. Another 50 million years brings us to Midway time, when the Permian Basin was a dry area of upland, already considerably higher in elevation than the Gulf shoreline which ran along a line drawn from Eagle Pass to San Antonio, Austin, and Dallas. The final 50 million year period between Midway time and today was one in which geologic mountain building was world wide. This accounts for the major mountain systems we know in the world today, as well as for the lesser mountains and hills in the Permian Basin.

Geologically speaking, then, the Basin derives its name from the great thickness of Permian deposits laid down in the area during the 150 million years between the Pennsylvanian and Woodbine periods.

And lest there be a misconception of the meaning of the word Basin, let it be said that the term has no reference to

the elevation or depression of the surface of the land, but rather to the structure of the underlying rocks. The "Staked Plains" of the Panhandle, highest continuous area in the state, are a part of the Basin, as are the level prairies, the sand dune areas, and the mountains and hills of other sectors.

For easy identification geologists normally break the Basin down into three large sub-areas: The Central Basin Platform, a long, comparatively narrow shelf-like feature which extends from the Hobbs-Monument producing area of New Mexico to the Yates field in Pecos county; the Delaware Basin to the west, the center of which is in Reeves county; and the Main or Midland Basin located to the east. Although significant oil discoveries have been made in both the Delaware and the Midland Basins, it is in the Central Basin and its associated area, the Northwest Shelf, that the majority of truly prolific fields have been developed.

Oil is produced in the Permian Basin area from rocks of nearly every geologic age from Cambrian to Tertiary—from Upper Permian, Middle Permian, and Lower Permian beds, from the Pennsylvanian, from the Siluro-Devonian, from the Ordovician series and even from the Cambrian. Producing wells range in depth from about 100 feet in portions of the Yates field to more than 11,000 feet in several fields where production is from the Ellenburger (Ordovician). All major discoveries to 1930 and a majority of the more important ones since that time have been in the Permian beds—thick, porous dolomites which are chiefly of reef origin. Estimates show that about 96.5 per cent of the 2,390,000,000 barrels of oil produced to date in the Basin have come from these beds; and that they harbor 76 per cent of the known reserves. While present estimates of proved reserves in known fields indicate that 84 per cent of the total ultimate production from the Permian Basin of West Texas and New Mexico will come from the Permian, the rate of discovery of important Pre-Permian fields in the last two or three years suggests the probability that Pre-Permian oil may finally represent one-third of the ultimate production from this area.

As in most other important oil producing areas, early development in the Permian Basin was in the younger, near-surface rocks of the upper part of the Permian series. Oddly enough, however, the very first oil in commercial quantities was found in the Middle Permian beds. This discovery was the Westbrook field in Mitchell county in 1921. While the field drew little immediate attention from the growing Texas oil industry it did awaken a consciousness of the possibilities in that part of the state, and because it did there was a lapse of only two years between Westbrook and the discovery of two highly significant fields situated on the eastern and western extremes of the Basin. The Artesia field was discovered in the Upper Permian strata in New Mexico in 1923, and in May of the same year the Big Lake field in southwestern Reagan county became the first major Permian Basin discovery in Texas. The latter was also the first of a number of fields to be developed on land owned by the University of Texas—fields which since have made the University one of the wealthy institutions of learning in the land.

The Big Lake discovery fired the imaginations of geologists and oil developers and initiated an intensive exploration and drilling program, which continues to this day, although, at a slackened pace. Its first reward was the big McCamey field in 1925, and that was followed the next year by major discoveries in Winkler, Pecos, Ector, Crane, and Upton counties—all in the Upper Permian beds. Also in 1926, substantial discoveries were made in the Lower Permian beds in Howard, Glasscock, and Mitchell counties.

Such a hectic campaign of drilling and development was spurred by the discoveries of those two years that by 1929 the Permian Basin area produced 133 million barrels of oil and brought about the problems which always attend over-production. Crude oil prices were affected adversely.

PERMIAN BASIN oil producing region embraces 35 counties in Texas and New Mexico and covers a total area slightly greater than that of the state of Pennsylvania, birthplace of the petroleum industry.

Buyers of the oil from the prolific wells in the rapidly multiplying fields found their ability to move the crude heavily overtaxed.

Thus it was that the first large-scale proration was brought about by the industry itself when the tremendous producing capacity of wells in the Yates pool was reduced voluntarily to a point consistent with the transportation facilities and the market. During the same year the prolific formations of the Hobbs, New Mexico, pool were tapped and it too was placed on a basis of ratable production from the beginning.

MOST OF THE AREA'S 262 fields are located on the highly productive Central Basin Platform extending from Hobbs on the north to the Yates pool. Humble district headquarters are indicated by stars.

While all of this activity was in progress in widely separated sectors of the Permian Basin, the young Humble Company was turning its attention in that direction seriously. Less than 10 years old when the Permian Basin came into the limelight, Humble's principal holdings and operations were along the Gulf Coast and in north and northwest Texas.

Limited drilling and producing operations were started by Humble soon after the discovery of the McCamey field in 1925. But even prior to that time Humble Pipe Line Company completed the first major pipe line into the area in April, 1925, connecting the Big Lake field with Humble's main north Texas-to-Webster line at Comyn. With the flush production of the early Basin fields offering a major source of supply for railroad fuel oil, Humble in 1926 began construction of a refinery at McCamey to supply this market. In the following year the Production department created a permanent operating headquarters and employee community at McCamey, and during the same year Humble Pipe Line Company began and completed its second major trunk line from the Basin area—this one to tidewater at Ingleside. It was also in 1927 that the Company's Sales department opened marketing facilities in the area, building bulk and service station outlets to serve the expanding oil industry and the thousands of car owners in the new and busy communities which grew apace with the development of the oil fields.

For a full 20 years, then, Humble has been intimately associated with the development of petroleum resources in the vast Basin area.

Humble Pipe Line Company has moved out from its original points in the area—westward, northward, and southward, lacing out fingers of pipe in every direction to serve a high percentage of the fields which have been brought to productivity over the past two decades. Hundreds of miles of small- and medium-sized gathering lines have been laid; numerous small field pumping units and intermediate pumping stations have been installed. Oil has been taken and is being taken ratably from any and all fields within reach of major Humble lines, affording all producers a fair and equitable outlet for their oil. To make possible greater service to the area, Humble Pipe Line Company soon will begin construction of several major loops on the West Texas-Ingleside line to increase its capacity by about 15,000 barrels a day.

Cumulative figures of total pipe line runs out of the Permian Basin give evidence of Humble Pipe Line Company's importance in the area. Since that April day in 1925 when the first barrel of Big Lake crude was charged into the newly completed line, Humble Pipe Line has transported from the Basin to market 774,326,772 barrels of crude oil, approximately 32.4 per cent of the area's total production of 2,390,000,000 barrels, as of January 1, this year.

Probably at no time in the history of the Basin has the significance of Humble Pipe Line's part in transporting oil been so effectively shown as during World War II. With Allied victory depending in a large measure on ample supplies of high quality fuels and lubricants, Humble's big underground system carried a daily load of 700,000 barrels. Much of that enormous volume flowed out of the Permian Basin; much of it was routed through special emergency connections and reversed lines into the Big Inch line in East Texas for shipment to eastern refineries.

Humble Pipe Line operations for the entire Permian

Basin area are centralized in the West Texas division office at Midland. Two major district headquarters are located at McCamey and Odessa, and within these districts there are 10 major pumping stations and a host of smaller pumping units on the widely scattered field gathering system. Pipe Line Company employees total 425, with the majority of them living in Company housing communities adjacent to pumping stations.

Humble's Production department operations have also grown considerably since the early years. The West Texas division headquarters are at Midland and major district operational headquarters and employee communities are now maintained at McCamey, Wink, Andrews, Wasson, Odessa, and Hobbs, New Mexico. Smaller sub-district headquarters are at Howard-Glasscock, Penwell, Sand Hills, Wickett, Keystone, and Levelland in Texas, and at Jal and State G near Eunice, New Mexico. Total number of drilling and production operations employees, including division office personnel, aggregates 360.

While the Humble Company is not a leading producer of crude oil in the Permian Basin, operations are widespread and of considerable consequence. The Company's production in the area during the past year approximated 8,000,000 barrels, and estimates are that Humble properties constitute about five and one-half per cent of the known reserves. Exploration and drilling operations were increased during the past year in a continuing effort to find new production in some of the promising deeper horizons.

Sales department operations, although at present concentrated primarily in the southern portion of the Basin area, are spread over a considerable region to serve both highway traffic and local consumers. Seven bulk distributing plants, 13 Company operated stations, and 65 or more dealer outlets constitute the present marketing facilities under the Humble sign. These operations are conducted out of the district office at Abilene, and a sizeable number of Sales employees make their homes in Permian Basin area communities.

These varied and widespread Humble operations fit into the pattern of overall production, transportation, refining, and marketing functions conducted by a number of oil companies, large and small, in the Basin area. Drilling and production operations, of course, are a major function. With more than 600 concerns, employing approximately 25,000 people, engaged in this end of the business the Permian area alone during the past year produced more oil than any other nation on the face of the earth except Venezuela. It alone produced more oil than any state, except Texas, of course, and California. It holds the distinction of having 16 of the 83 fields in the United States which produce 10,000 barrels or more per day; it also has seven of the 57 fields in the nation which have produced to date more than 100 million barrels of oil—Yates, Hendricks, McElroy, Howard-Glasscock, Wasson, Hobbs, and Big Lake.

Quite naturally, an adequate and comprehensible description of this oil empire is difficult, but seen from the air it presents an interesting pattern, almost incredible because of its extent. At the southern extremity of the area, in the highly productive Yates pool, gleaming production tanks are scattered about the floor of the canyon and at many levels on the shelves jutting from the sheer steep sides of the hills. In the Pecos River valley below are clustered the pipe line pumping stations and storage tanks, the clean orderly field communities where the people live. In this field, looking like any other flowing well, is the world's largest gauged producing well. The Yates A-30 some years ago was gauged at the rate of 8,528 barrels an hour, 204,681 barrels a day.

From Yates on up through McCamey, Crane, and McElroy fields the scene changes a little. Wells and tanks are huddled along the bases of the irregular, flat-topped hills as if seeking their protection. Then come the sand dunes of Ector, Winkler, and Ward counties and their numerous producing fields. Derricks and production tanks are scattered about the bald, undulating dunes in an almost unbroken procession up to Lea county, New Mexico, on the western fringe and to Andrews county on the eastern. Here the land becomes flat prairie—ranch land in New Mexico, ranch and farm land in Texas. The latter condition prevails for the most part northward through Gaines, Yoakum, Dawson, and Terry counties and on into the better farming land of Cochran and Hockley counties. Sprinkled over this entire region, along with producing and drilling wells, pipe line stations, and growing communities are gas plants and carbon black plants. For although the Basin is primarily an oil region, natural gas production is extensive. Sixteen natural gas plants in the area converted many millions of cubic feet into liquid fuels in the past year; and nine carbon black plants utilized many millions more in the production of 180,000,000 pounds of carbon black.

What strikes the visitor to the Permian Basin about as forcefully as anything else is the fact that in spite of the area's enormous oil and gas production and the resultant expansion, cattle and sheep raising and farming go on apparently quite unmindful of the oil business. It is a common sight to find fat white face cattle grazing between derricks and production tanks; to see sheep resting in the shade of other tanks; to see pump jacks nodding in the middle of cotton and grain fields.

In fact, ranching and farming have made forward strides in the past quarter century. The value of cotton and feed crops grown on some 3,000,000 acres of cultivated land in the area in 1946 was $19,500,000.

More than 25 million acres of grazing land in the area supported over a half million head of cattle, 85 per cent of which are Herefords, and a little more than two and one-half million head of sheep. The annual income from cattle approximates $14,000,000; the value of the lamb and wool crop in recent years has averaged about $17,500,000.

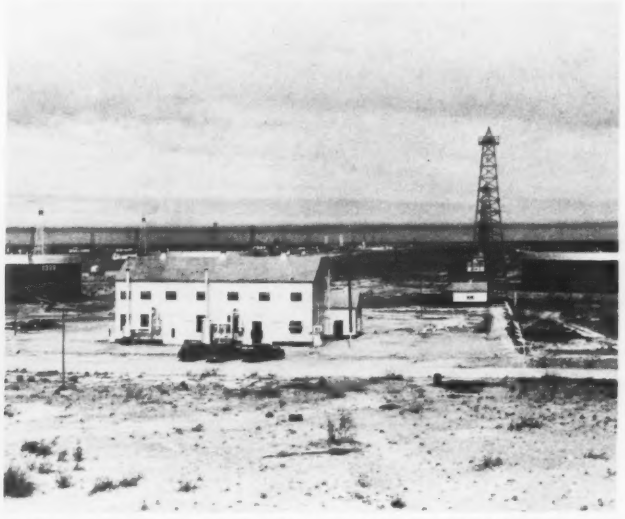
Thus, while the Permian Basin area has rapidly come to occupy a position of prominence in the world oil picture—cattle and sheep growing and farming continue at highly important levels. The great additional wealth which comes to the area annually from petroleum has done much toward aiding ranchers and farmers to improve their properties, the breed of their stock, and to spur their interest in better ranching and farming.

In the growing, busy communities petroleum and the many businesses associated directly and indirectly with oil supply the stimulus that keeps business good and the communities prosperous.

The Permian Basin today, contrasted with the Permian Basin 25 years ago, cannot be painted in any other terms but that of a great transformation. Petroleum has been the major cause of that change. Petroleum will continue to be the mainspring of the area's progress for years to come, for with continued orderly development and scientific production the Permian Basin has a calculated life expectancy much longer than its past.

IN THE VALLEY BELOW YATES FIELD A PIPE LINE STATION AND CAMP... IN KEYSTONE FIELD WHITE FACE CATTLE GRAZE

ON THE PRAIRIE NEAR WASSON A PIPE LINE EMPLOYEES' CAMP . . . ON OUTSKIRTS OF HOBBS A DISTRICT PRODUCTION CAMP



ON THE STREETS OF ODESSA SUNDAY AFTERNOON TRAFFIC... IN THE JUDKINS FIELD A PIPE LINE STATION AMONG DERRICKS

FROM THIS HILLTOP looking southwest toward Fort Stockton the valley was carpeted with oil development. The brightly blooming plant in the foreground was a mystery, but was found later to be a species of cactus common in the area.

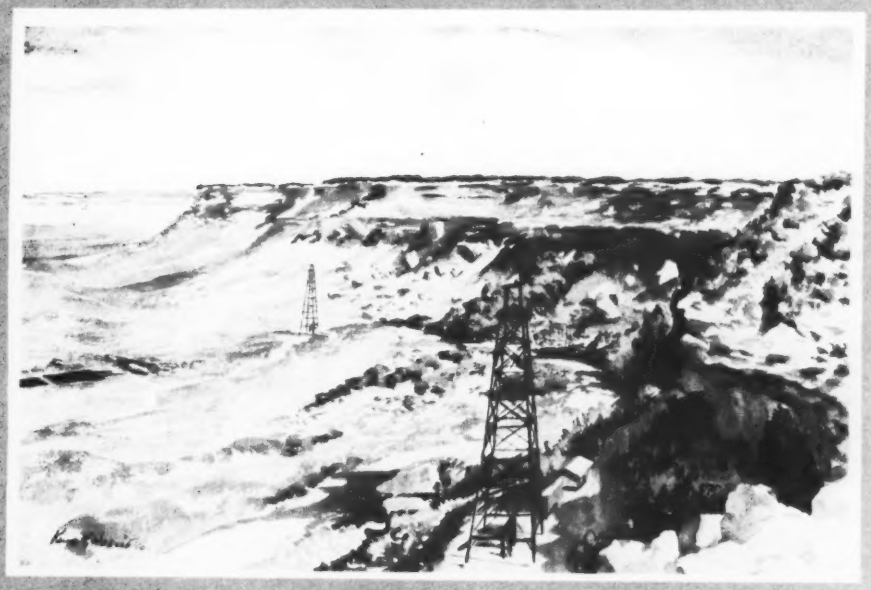
THE TRIM SKYLINE of the town of Midland, from down near the railroad station, seemed to personify the progress and expansion so common to West Texas communities.

DRILLING CREW members were painted while at work on the rig. The roughneck below is typical of many to be found out there. The engineer had just pushed his goggles up after finishing a welding job.

OIL IN THE PERMIAN BASIN

Artist Kenneth Harris realized that oil had contributed much to Permian Basin prosperity, but he was most deeply impressed by the comparative insignificance of man's additions to the vastness of the natural scene. For two weeks he roamed over the area, painting what appealed most. From his portfolio of watercolors these were selected because they portray the color and variety of the Basin area so realistically.

He found it quite exciting, he said, to paint the extremes — the windswept prairies and sand dunes on one hand, and the rugged hills and broad valleys on the other— and the busy, growing towns.



ON RICTER LEASE about eight miles north of McCamey—a country of sheep, prairie dogs, rattlesnakes, and oil wells. Below, drilling in the sand dune country north of Kermit. The sand may look warm, but the temperature was around 35 degrees and a biting wind was blowing.

They are

TESTING GRAVITY of oil after determining basic sediment and water with "thief" resting on tank opening. Gauger is dressed for cold weather, seals outlet valve on tank with bands hanging from belt after oil is run.

Dependable

Pipe line field gaugers have proud tradition of long years of dependable day-and-night service

IT HAS been written of those who carry the mail that "Not snow nor rain nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds." Postmen are proud of that tradition, and rightly so. The mail must—and does—go through.

Oil fields have their "postmen," too; men who are as dependable, as punctual, and as accurate in their deliveries of oil as those who push through all kinds of weather to deliver mail to your door. They wear no uniforms, blow no whistles, never ring a doorbell in the performance of their duties, and most of the world never hears about them. They are the pipe line field gaugers.

Humble Pipe Line Company field gaugers have a proud tradition, too. It has been earned through long years of dependable service; it is founded on accuracy and devotion to duty, day and night, in every kind of weather. In fact, with very little paraphrasing—by changing only a word or two—the tribute to the postal service fits field gaugers like a glove.

Oil, like the mail, must go through. Gaugers see that it does. Not only are they responsible for gathering oil at points of production; it is they, and they alone, who are responsible for initial measurement of volume and determination of basic sediment in the oil they handle. They have discharged those duties with such distinction that their record for integrity and accuracy is unimpeachable.

What kind of men are these gaugers? Where and how do they work? What are the natures and extent of their duties?

To answer the first question, stop for a moment and ask yourself what kind of man you'd like to have handling *your* oil if you were a producer selling your crude to Humble. You'd want him to be punctual, so that none of your tanks would fill up and sit idle, for that means shutting down production until the tanks can be cleared. He should be well trained in his work, so that tests and measurements will be accurate. Remember, he may be handling thousands of barrels of your oil. Errors could cost you plenty. As a final qualification, you'd want him to be honest and friendly in his dealings with others, worthy of their trust as well as yours.

The Humble field gauger fits these descriptions. You have only to see him —to spend a few hours with him on his rounds—to believe that. He is a straightforward man, an outdoorsman; his smile is ready, his handclasp firm.

Field gaugers are often the only Humble representative with whom others come in contact, and lasting impressions of the Company are formed from those contacts. Living, as a rule, near the leases they serve, gaugers see and talk every day with producers, landowners, and their representatives. Their acquaintance is personal; many of their problems common. In short, theirs is more than a business relationship. They are neighbors.

It is a well-known maxim that men are often judged by the company they keep; it is just as much a truism that any company is judged by the employees who represent it. Humble gaugers know that, and conduct themselves accordingly. They have established a reputation not only for a thorough knowledge of their work, but also for their ability to understand and get along with others.

These, then, are the men—some 230 of them—who turn more than a half million barrels of oil a day into the Company's gathering system from fields all over Texas and parts of New Mexico. Main lines pick up the oil and deliver it long distances to refineries, storage points, seaports, and to other carriers.

There are five major divisions of Humble Pipe Line Company in Texas, and 153 gauging districts. For each division there is a Chief Gauger; for each district there is a District Gauger who in the larger districts may have a number of assistants. District gaugers and their assistants are called "field gaugers"; their work is done in the field, on the lease. The Chief Gauger maintains an office at division headquarters and has general supervision over all gauging operations in that division.

To describe the field gauger's work, let's set up a typical case, beginning with the discovery of a new field. A few wells are drilled into the producing formation, the Texas Railroad Commission sets up daily allowables for each well, and oil begins to accumulate. This oil is stored in tanks built by the producer on or near the lease. These are called *lease tanks;* two or more of them placed together making up a *battery.* But, in any case, storage space is limited; crude produced by the wells must be kept moving to make room for more.

At this point, Humble Pipe Line Company enters the picture by laying gathering lines to lease batteries and by assigning field gaugers to handle the oil which is accumulating in storage. Where oil will not move into the lines by gravity pumps are provided.

Since these are new tanks, the gauger will "strap" each one before he moves oil out of it. Strapping is oilfield language for measuring the dimensions of a tank. The gauger takes his measurements and sends to the main office figures on the vessel's circumference (reading taken at several places), depth, wall thickness, and amount of deadwood or supports inside the tank. Engineers translate these figures into barrels of oil; so many feet and inches meaning so many barrels of oil.

Actual gauging work is divided into five separate operations. First, the gauger "thiefs" the tank. That's not as bad as it sounds. A thief is only a cylinder of glass or metal, or both, which the gauger uses to take a bottom sample of oil. This reveals the volume of basic sediment and water (abbreviated to B.S.&W. by oil men) at the

GAUGER TAKES reading from the steel tape line he uses to measure depth of oil in the lease tank. Figures in feet and inches are later correlated with other test data, then converted to barrels.

READING THERMOMETER after it has been immersed for several minutes in the oil. A few degrees of temperature variation can change total volume by several barrels. Hydrometer protrudes from oil in thief.

bottom of the tank. If there is too much B.S.&W., the producer is requested to remove the oil and treat it or drain off the water until it can be accepted for transportation through the pipe line.

If the gauger is satisfied with the B.S.&W. content, he takes the oil's temperature with a specially made thermometer which he lowers about half-way into the liquid. The thermometer is allowed to remain in the oil for several minutes; while it "soaks," the gauger measures the oil's depth in feet and inches, using a steel tape with a plumb bob attached. Experience has given him just the right "feel" to know when the tip of the bob is touching bottom. Great accuracy is observed, for even a slight error may throw the final barrel figures off.

It is time now to draw up and read the thermometer quickly but accurately before outside temperature can change the mercury's position. This reading goes hand-in-hand with the tape line figures, for temperature directly affects the volume of oil in the tank. Like other liquids, oil expands when hot; contracts when cold.

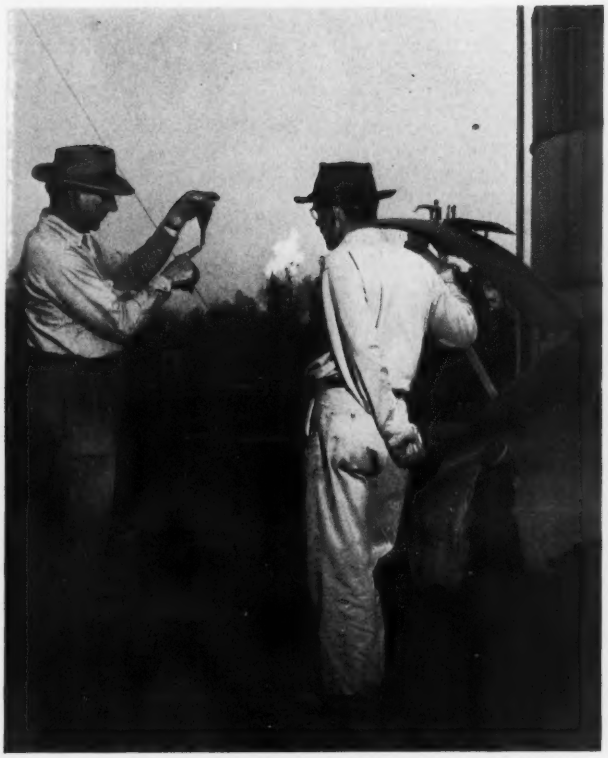
Next, a gravity test is made by a hydrometer; a long, slender glass instrument which weighs oil by a method quite different from that employed by the pounds-and-ounces scales in your corner drug store. Placed in a sample of crude oil, the hydrometer sinks to a depth determined by the oil's weight. Readings are taken in degrees and tenths of degrees of gravity from the hydrometer tube at the exact point where it protrudes above the oil's surface.

The gravity test is extremely important, and the hydrometer must be read with pin-point accuracy, because gravity directly bears on the money value of the oil. Prices of crudes depend to a considerable extent upon their gravities. On the whole, light crudes (those with high gravity) demand higher prices than heavy ones, primarily because light crudes, as a rule, contain relatively more materials from which gasoline and other valuable products can be made.

Only one gauging operation remains, the centrifuge test. A sample of oil is mixed with gasoline, spun at high speed in a centrifuge, then removed and examined. Solids and water (the B.S.&W. previously mentioned) settle out at the end of the centrifuge tube; if these make up more than one per cent of the total volume, special action must be taken before the crude can be moved. In any case, deductions are made for B.S.& W.; for example, if there is one per cent, a barrel of oil will be deducted for every hundred barrels moved when final settlements are made.

All tests and measurements complete, the gauger opens the valve which allows oil to flow from the tank into the gathering system. Then, taking his notes, he fills out the first part of a "run ticket." All his findings are recorded on this ticket, and he and the well owner's representative sign it. The run ticket, however, is not completed until later, when the gauger or his successor on the next tour comes back and closes off the outlet valve. At that time, another feet-and-inches measurement is made of the oil remaining and another thief sample is taken. These data, and the time of measurement are recorded, the well owner's representative and the gauger sign again, and the run ticket is complete.

Let's look at this run ticket. It is something of sufficient interest to merit close and detailed study. On it, besides the results of the gauger's tests and measurements, are such items as the date, time of gauging, number of wells serving the tank, tank number and



GAUGER POINTS to one tenth of one per cent basic sediment and water in centrifuge tube. Well owner's representative (right) agrees. B.S.&W. will be deducted from total volume before payments are made.

PRODUCER'S REPRESENTATIVE signs the run ticket after tests and measurements are recorded by field gauger, who also signs. Ticket then becomes virtually a check written on Humble, is paid without question.

capacity, manner in which oil was moved, and pump station to which it was moved. Once properly filled out and signed, *these tickets are accepted by all concerned at face value, for payment without dispute.*

Gauging technology has progressed with the rest of the oil industry. More and better tools and instruments than those available to old-time field gaugers make it possible for their modern counterparts to do a much more thorough and accurate job. Where gaugers once went on horseback, they now go by automobile, and the amount of equipment they carry has increased many fold. As soon as the necessary equipment becomes available Humble will supply gaugers with special cars featuring a compact, unitized, built-in compartment for instruments and tools.

Unitized equipment may increase the gauger's efficiency and make for greater neatness. But as far as accuracy is concerned, it will be more or less gilding the lily. These oil field postmen are already as accurate as skill, good equipment, and the proper attitude can assure.

NEW, UNITIZED GAUGING equipment to be used in the field soon gets a critical inspection as Gulf Coast Division chief gauger (right) explains features to Katy District gauger.

The Search for OIL

By J. F. McRAE

Acting Chief Landman

Landmen contact people in every walk of life to secure leases and pool acreage in areas of interest

FOR anyone who is familiar with the concept that the oil business is less than one hundred years old and who also has a slightly quizzical attitude toward things in general, nothing can be quite so engaging to fancy as the multiplying evidence from earlier times that knowledge of oil and possibly the oil business itself are as old as history. Glassmire notes from the book of Job an observation that the "rocks poured out rivers of oil," that Moses' ark of bulrushes was "daubed with slime and with pitch," that a royal concession for an oil refinery was granted by Louis XVI in 1745; that Milton in "Paradise Lost" refers to a row of lamps and a cresset "fed with naphtha and asphaltus"; and finally that our own George Washington, after discovering the burning springs of West Virginia and Pennsylvania, made predic-

Moses' ark was daubed with slime and pitch . . . George Washington made predictions as to value and future use of petroleum

tions in his will as to the great value and future use of petroleum.

These allusions and records have been found by the dozen and each makes its interesting contribution to the inquiry. In the opinion of some, however, Mr. Max Ball rang the bell on the subject when he related in a 1940 publication that none other than Cleopatra had found time from her other engagements to have a fling at the oil business. In one of his campaigns Mark Antony captured the then coveted Dead Sea asphaltus "fishery" and as a birthday present or in some other gesture befitting the times and circumstances, conveyed the producing property to the Queen. It can be derived from the story that Cleopatra soon tired of the worry and responsibility incident to operating an oil property. In any event she leased it to one Malchus the Nabataean. Either the property was marginal or Malchus' talents and abilities ran to other lines as our last glimpse through the enveloping curtains shows him with his lease forfeited, a busted oil man and in debt to a monarch whose recorded virtues did not include tenderness of heart.

It could be wished, in fancy at least, that the project had been more successful. Who knows in that case but that we might have had the simple beginnings of an oil organization expanded even then to include such specialized members as geologists, geophysicists, scouts and landmen. We landmen could then hark back to a glamorous historical origin and proudly refer to the first in our professional numbers as some contemporary of the Caesars, perhaps even poor Malchus himself, who had served well under Cleopatra as landman for the Upper Nile Asphaltus Fishery and Refining Company. But history did not so favor us. In fact it is somewhat vague as to any specific origin we might have at all. In the banter of our fellow workers we are sometimes characterized as the spiritual progeny of David Harum. Actually we are a relatively obscure but necessary service unit in the modern oil business and perform one of the several indispensable functions in the search for oil.

In the articles of this series already published the somewhat amazing facts have been pointed out that the specialized services of geology and geophysics have only recently come to be utilized in the search for oil, these advances having been made in the careers and largely through the efforts of many men still active in the industry. It has been shown that in the period prior to the acceptance of these scientific aids, the function of the scout was much more comprehensive and varied than is his present specialization. Areas of interest were not then defined as they generally are now through application of geological and geophysical methods, and when a show was reported or a buying program by others commenced, the scout often of his own motion and on his own judgment dived into the melee and came out with lease purchases for his principal. In this particular activity he was operating as a lease buyer or landman and in the separation and specialization of function which came with the application of scientific methods it is not surprising that many scouts moved into the land specialty. Among the landmen today a large number came from scouting experience and while the scout in the larger modern organization seldom serves in any buying capacity, you have been told that one of his duties is to keep up with competitive buying activity and this coupled with the knowledge he must gain of practical oil field operations gives him a helpful background of experience for land work. Another source of supply, increasingly drawn upon in the past ten or fifteen years, is a group of legally trained men who begin their careers as titlemen. As the name suggests, the titleman is a land assistant who serves in the important function of working out title problems and securing the curative data needed to give an operator the

title assurance required in good business practice before risking the large sums now involved in exploratory drilling.

A typical unit of land organization today consists of the landman, one or more assistant landmen and a group of titlemen directly supervised either by one of the assistant landmen or a title supervisor. This group is charged with the responsibility of acquiring for the operator the right to explore interesting areas which have been isolated through the geological and geophysical methods discussed heretofore in this series.

When the geologist has made his determination as to an area of prospective interest within his territory, he turns the matter over to the landman, informing him as to the outline of the area and as to the nature and extent of the prospective interest. It then becomes the responsibility of the landman to formulate a program for acquiring leases in the area and it is his duty and ambition, of course, to acquire as many of the leases as can be obtained on any reasonable basis. Since the oil business is one of the most intensely competitive of all businesses, accomplishment of his objective or achievement of any creditable measure of success in the undertaking can require careful planning and a generous amount of energy and ingenuity. In a small number of cases the area will consist of only a few large ownerships and the problem of contact, at least, is relatively simple. In many cases, however, the ownership will be divided into numerous tracts and undivided interests and the landman will find that the owners represent something of a cross section of our American population, covering in range people in almost every class and walk of life. It is readily apparent that the problem of arranging for contact and negotiation with such a large and varied group can present a sizeable problem in itself and it is often necessary for the landman to employ the services of groups of independent lease buyers, known in the industry as "brokers," in order to cover the ground under the time limitation inherent in any such competitive enterprise.

This reference to the subject of contact brings to mind an experience which a budding young land assistant once had in that field. The experience is hardly typical in day-to-day land work; but it is by no means unique as there have been other cases equally involved and equally difficult of solution.

Among landmen today a large number came from scouting experience . . . others from legally trained group who began as titlemen . . .

Landmen deal with people in almost every class and walk of life . . . with great numbers when securing agreements to pool interests . . .

In any event it illustrates many of the elements present, usually in lesser degree, in the landman's problem of contact. Perhaps the experience will seem more real to us, and possibly more interesting, if we will consider that we shared the landman's problem from the start and accompanied him in each stage of its solution.

As to the law, we will recall that the most common type of real estate ownership under Texas law is what is known as "community property," that all property accumulated during a marriage other than that which comes to the husband or wife separately through gift or inheritance falls within this class, and that when the marriage is dissolved either through death or divorce this community ownership is divided half and half. That either party to the marriage may dispose of his or her half by will in any manner desired, but that if there is no will, certain rules are specified in the law as to how the property is inherited. That if there are no children the surviving spouse inherits the one-half interest of the deceased spouse, but that if the deceased member of the marriage leaves a child, either from the subject marriage *or some former marriage*, that child rather than the surviving spouse inherits the one-half interest in the community property.

Now for our facts. Shortly after the turn of the century (we found that it was 1902) a man residing in one of the midwestern states became involved in some tragic unhappiness and apparently resolved to begin an entirely new existence in Texas. There have been many similar instances, of course, but this one seemed unusual in that the subject, although in no way suggesting the criminal type, appeared nevertheless to live in a determination that no information should escape him as to his first existence. Fifteen years after he came to Texas he was killed in an accident. During that time he had remarried and he his wife had accumulated a modest amount of community real estate. No children were born to the marriage and after the death of the husband the wife conveyed the real estate on the theory that she owned it in its entirety, having inherited the husband's one-half interest in the absence of any will or child. A few years later she died. Some ten or fifteen years after that it became

Files of city directories and investigation of records at court houses often bring to light needed facts . . .

apparent that the property would be productive of oil and a lease agreement was made with the grantee in the conveyance by the widow.

The title was then examined with considerable care and through close scrutiny of the record a lawyer observed that in the affidavits made concerning the marriage of our subject there was no specific statement as to whether he had been married previously or, of more importance, whether he had any children by any previous marriage. The lawyer very properly required further proof, and it was at this point that we entered the case. Our local investigation was singularly unproductive of helpful information. We located several elderly men who had at one time or another worked with or known our subject but their stories uniformly showed a case of a man determined to withhold even the smallest information as to his earlier history. It had been necessary for him to say that he had come from somewhere, and we learned that he had named one of the larger midwestern cities. We were informed also that on a few rare occasions he had dropped his guard to the extent of referring to "two sons."

With only these scant clues we left on the trip which we hoped would lead us either to the children or the true facts. We had reason enough at the time to suspect that our problem was further complicated both by an assumed name and assumed city of origin. We found that our suspicion on the second point was correct but that, fortunately enough for our undertaking, there was no change in name. But we didn't yet know these things and we were headed for the midwestern city. On the way we had time to do a little reasoning. If there had been two sons, it was likely, of course, that there had been a wife and since our subject had left the scene so decisively it could not be a bad guess, particularly in view of the Texas marriage, that there had been a divorce. If a record of the divorce could be found we would be well on our road to solution as it would give us the name of the wife and probably the names of any children. Therefore as we drove into the city our very first stop was at the county courthouse. But the divorce records showed nothing. What next? We had no proof at this time that our subject had not in fact lived in this city and that point had to be checked. This was going to be tough. The name with which we were dealing was an unusually common one and the period to which our search was directed was then more than thirty years past. We went to the municipal library and found what we had hoped would be there—a file of city directories running back over the last fifty years. We chose a period of ten years ending with the first year our subject appeared in Texas and listed all entries whose given names and initials, in any combination or abbreviation, might be his. With the same city directories we then eliminated most of the names on our list through finding them repeated and identified by the same address or same name family status in the year following the close of our period of search. With each of the remaining names on the list there was nothing to do except visit the last address shown and attempt to develop from the present occupant or neighbors enough history to satisfy us that we were either on or off the trail. We spent a week in this laborious undertaking and while our information was sketchy in spots and far from being positively conclusive, we became fairly well convinced in our own minds that our subject had never been the head of a family residing in this city.

It was then necessary to do some reasoning on the question of what should be our next move. A person naming a city as his former place of residence would hardly risk naming a city with which he was not familiar and since travel was more difficult in those days, wasn't it possible, even likely, that the true residence of our subject had been in some outlying town not too far distant? Our next move was based on a combination of two theories, this one and the divorce theory, and the next morning we began our systematic investigation of divorce records in adjoining county seats, taking first the tier of counties surrounding us and working out in something analogous to concentric circles. At the eighth county seat we hit. The divorce had been in 1902, the name of the man tallied and the decree disposed of the custody of two boys. It mentioned and divided property in a small town nearby (thus indicating the last place of family residence) and named a town some two hundred miles to the west as the place of marriage.

It was still several days before we actually found the surviving members of the family. In fact, we even had to go back to the point of marriage for our final successful lead. The family had moved numerous times over the period of years. finally to a place several hundred miles from the town of

Knocking on doors and making inquiry of present tenants helps locate previous occupants . . . leads to location of land owners.

1902 residence, but with such a wealth of names and facts —real facts—these final steps in the search seemed easy. By the time we reached the end of our trail we had lived so closely with the characters in our drama, first hypothetical and then real, that no doubt remained in our minds that we had connected the two lives of our Texas immigrant. However, we were to have also a very convincing measure of formal proof. A faded photograph on the dresser in the home of the oldest boy was brought back to Texas and used as a means for positive identification.

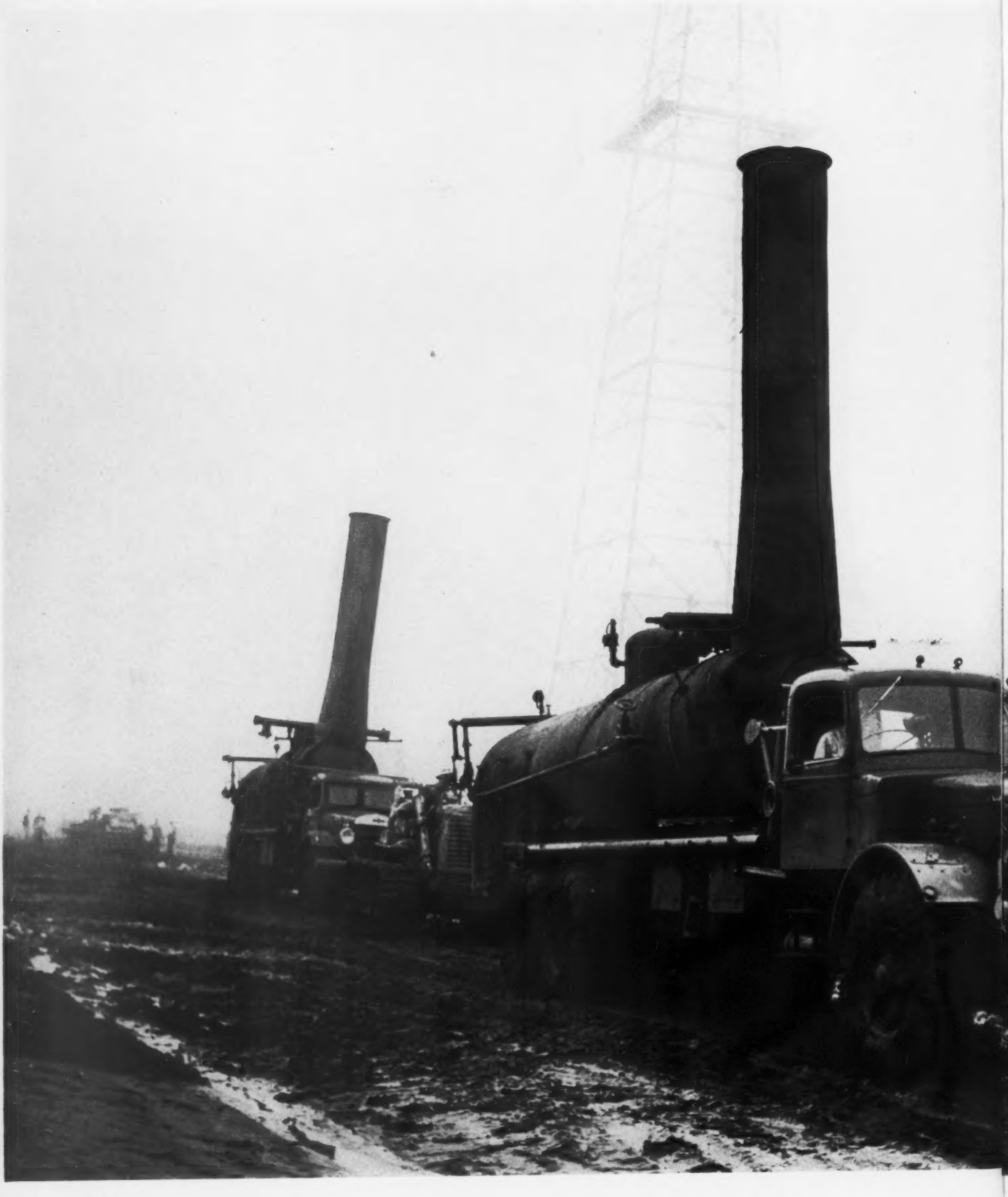
Now back to our general discussion of the landman and some of his other problems and procedures. One of his principal tools of trade is his lease form. And concerning this the modern landman can be thankful many times over for a somewhat standardized form which has come to be regarded in most cases as mutually acceptable both to lessor and lessee. It is known in the industry as the "Producers 88" form. While the exact figures are not known it is thought that this lease form has served as the basis for agreement in well over 90 per cent of all modern lease transactions. While there are some superficial and some important variances in the wording of separate editions of the form, its basic provisions have remained unchanged through a great many years. It has stood the test of literally thousands of lessor-lessee relationships and almost every provision in it has been interpreted by the courts. Needless to say it could not have achieved its unique and useful position in the oil industry if it did not furnish a high degree of fairness both for the lessor and lessee. Reduced to its simple elements, this form gives the lessee the exclusive right to explore and produce, provides that the agreement shall remain effective for an agreed number of years as primary term and as long thereafter as there is production, provides 1/8th royalty for the lessor, and if the lease is a rental lease (by far the most common), an annual stipulated rental is payable in lieu of drilling operations. Failure to either drill, produce or pay the rental terminates the lease. Usually, and it might be said almost invariably in settled oil territory, a cash bonus is paid to the lessor at the time the lease is executed. The landman would have reason to shudder and his principal would have even more reason to shudder if it were necessary to assemble a lease block on the basis of lease provisions separately conceived in each individual case. The aggregate product would be unworkable no doubt from the standpoint of both lessor and lessee and it is not at all unlikely that there would be unwittingly created numerous provisions unfair to both parties. In fact there is hardly a landman of even a few years experience who has not seen a case or two where an opinionated party would elaborately rewrite a lease form into an instrument which in practical application denied him some of the rights and benefits which would have been his had he accepted the conventional form.

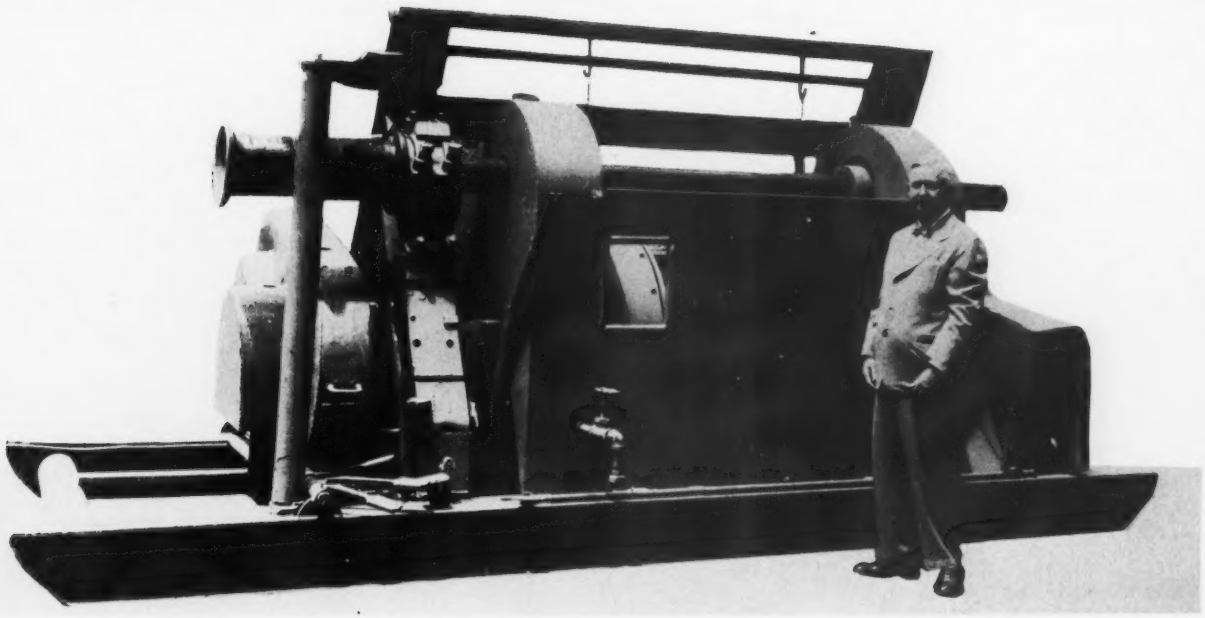
It has become increasingly true in the past ten years that the landman's work involves much more than the acquisition of leases. Most of the oil producing jurisdictions have now come to recognize the value of conservation and the economic folly and loss involved in unrestrained and unregulated production practices. State laws have been passed and regulatory boards created which require orderly spacing and development and equitable production withdrawals in producing fields. From this has come a type of contract work for the landman known as pooling or unitization. There will be within a producing area a tract of land under lease to the landman's principal which is smaller than the spacing unit prescribed by state law or the state regulatory board. In this case a unit for a well site will be designed to include the subject tract and sufficient land from adjoining ownerships to make up the prescribed shape and size. The landman then visits the owners of the constituent parts of the projected unit and secures from them agreement to pool their interests and share in the production from the unit well in the proportions that their contributed interests bear to the whole. Pooling has become such a fixed part of modern oil operation that the single unit example just given is only one of many. Whole fields have been unitized for the production of oil

Landmen's wide range of contact gives understanding of human nature . . . demands patience and sincerity in solving problems.

and gas. In this field-wide unitization the landman must contact every owner of interest in the field, a sizeable assignment in any case and in some cases involving literally hundreds of contacts distributed geographically over the entire country and sometimes into foreign countries.

It can be seen that the landman is a busy man and one who needs rather seriously some of the qualities of a good business man. He fingers the buttons of his professional vest: "richman, poorman, beggarman, thief, doctor, lawyer, Indian-chief," and reflects unto himself that people who write nursery rimes must not be people who do get around much, certainly not as compared with him. In any event his range of contact is such that he could not long survive without some understanding of human nature and behavior and without the ability to apply himself patiently and conscientiously to the task at hand. And the hereinabove mentioned jests of his fellow workers to the contrary, his activities are in fact highly circumscribed by certain ethical principles without which neither he, nor his principal, nor the enterprise would long survive. Whatever the source of these limitations on his procedural activities, and business judgment alone is sufficient, the landman of today knows as does the responsible operator whom he represents that any seeming gain made through misrepresentation or sharp practice is in fact no gain. At the time of his employment back in the thirties, one young landman was told in words impressive at the time and increasingly valued with the years that his employer seriously wanted any lease he was asked to obtain but that if it were necessary for him to procure the lease under any circumstances which would prevent his revisiting the scene on the following day with his head up and his conscience clear, his employer would prefer not to have that particular lease.





FIRST UNITIZED DRAWWORKS, DESIGNED AND ASSEMBLED ON CONROE WELL BY HU M. HARRIS, RETIRED HUMBLE ENGINEER

EASIER *to Handle*

Complete unitization of heavy drilling equipment simplifies dismantling and speeds up moving

PRIOR to 1932 the task of moving drilling equipment from one location to another was an undertaking which taxed men and available moving equipment, and consumed considerable time. Many items of equipment, which served as units while in use on or around the derrick, had to be partly dismantled for transportation—either because they were too bulky to handle or because they had to be disconnected from one another before loading was practicable. That meant the job of re-assembling at the new location again involved time-consuming work.

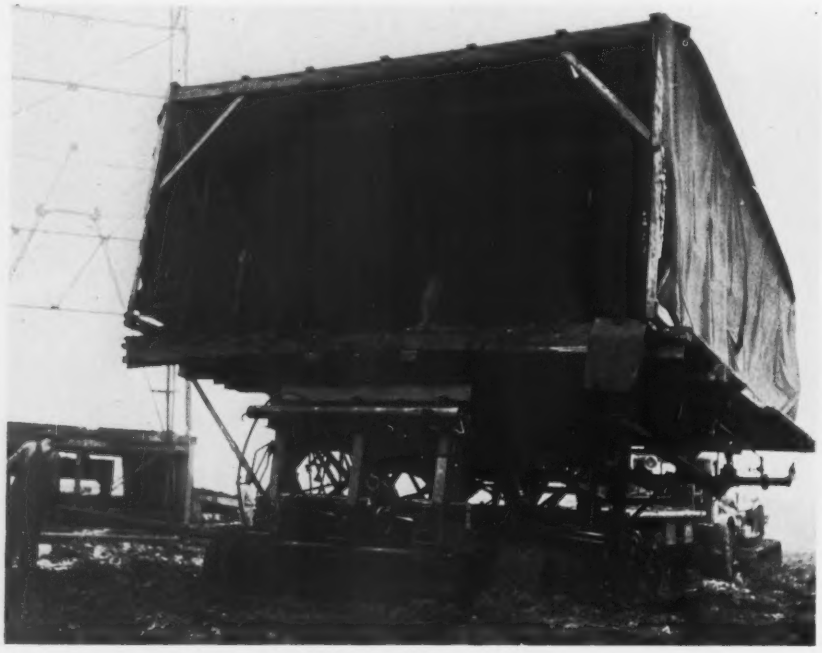
That was before Hu M. Harris, retired Humble engineer, conceived, perfected, and had built in 1932 the first "unitized" drawworks on a rig at Conroe. While this original model has been improved upon down through the years, it served as the incentive petroleum engineers needed to carry the idea of unitization ahead on other assemblies until today's rig is composed of a definite group of major units.

In addition to reducing appreciably the time required to tear down and set up a rig, unitization has materially simplified the transportation of drilling equipment. Today, with the aid of powerful, specially designed winch trucks, heavy rigs can be moved for short distances in a single day, even under adverse weather conditions. The pictures on accompanying pages were made on an actual moving job near Pleasanton, Texas, when roads were near impassable for an automobile, and a heavy shroud of fog hung like a blanket over the entire operation.

Tearing down a rig with unitized equipment consists of removing tie-downs and disconnecting mud, water, steam, or gas lines to the units at conveniently located unions. Trucks then

BOILERS ARE MOVED, one to a truck, with steam and water headers, stacks and gas burners left intact. Often the move is made with such dispatch that water in the boilers is still warm when they are unloaded and hooked up again to begin operation at the new location.

SPECIAL AXLE and wheels placed under the substructure makes possible the movement in one load of the drilling engine, house, and substructure with steam line in place. A single truck normally can handle this load with little difficulty, but needs help from a tractor in mud.



pull up to the units, pull them up on the truck beds with powerful winches, and move on to the next location where the equipment is unloaded at its proper position and in an orderly manner.

Boilers are moved with steam and water headers left intact, as well as stacks and gas burners. The drilling engine, house, and substructure are moved as a unit with steam line in place. This is accomplished with a special axle and wheels placed under one end of the substructure, while the other end is winched clear of the ground and pulled by the truck.

By using low ramps to the derrick floor, the unitized drawworks weighing from 15 to 30 tons is pulled directly from the derrick floor to the truck bed. The unitized coring reel and engine are handled in the same manner; slush pumps complete with suctions, suction racks and mud, water, steam, and exhaust connections are moved as units; and blowout preventer operating pumps

A SINGLE SKID, heavily loaded with the entire unitized boiler feed assembly, is winched on truck as crew members supervise operation.

are moved as a unit with discharge control manifold.

The boiler feed assembly, consisting of feedwater pumps, feedwater heater, generators, firing control, and necessary water and gas headers are mounted as a unit on skids and are handled in a single operation; the same is true of tool houses and dressing rooms.

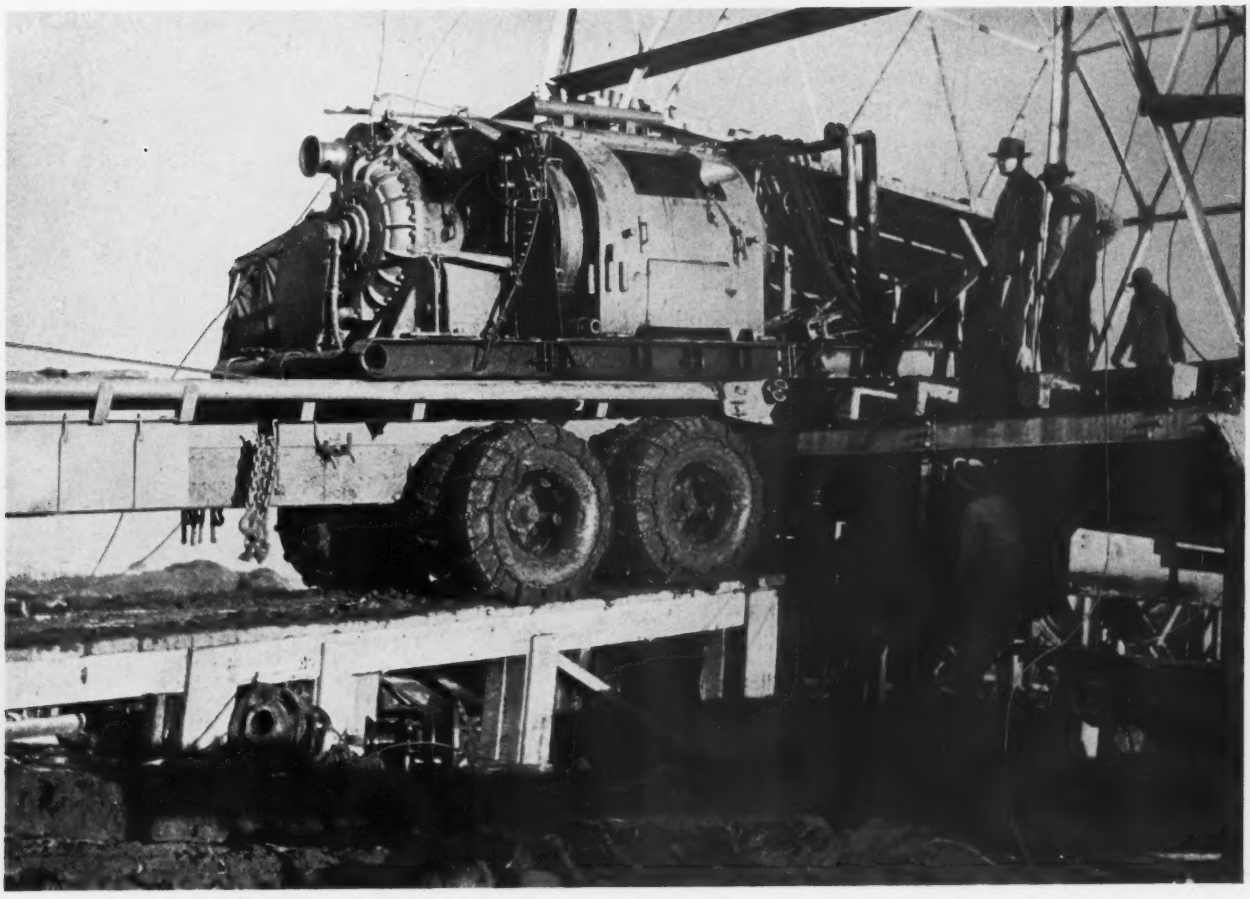
All such miscellaneous items as steam and water lines, walkways, and various supports are stacked in shop-made racks or baskets and loaded on trucks.

This complete unitization of drilling equipment has brought on single truck loads of increasing bulk and weight. Truck manufacturers have co-operated by building trucks of greater size and carrying capacity, some of which have a 30-ton capacity with 21 by 8-foot beds.

In addition to simplifying and speeding up moving, unitization of drilling equipment has made possible greater compactness, increased life of equipment, and economy of operation.

TOOL HOUSES and dressing rooms are mounted as a unit on one skid. Although bulky, the entire skid is pulled up on the truck and is transported to the next location in a single load in spite of deep, sticky mud. Handling such loads calls for powerful trucks and skilled operators.

UNITIZED DRAWWORKS, weighing from 15 to 30 tons, is pulled from derrick floor to waiting truck on specially designed low ramp.



By the way . .

At a dinner given by the China Institute in America on January 27 at the University Club in New York, DR. V. K. WELLINGTON KOO, Chinese ambassador to the United States, presented the certificate of appreciation, shown below, from the Republic of China to President H. C. WIESS.

中華民國 政府

NATIONAL GOVERNMENT OF THE REPUBLIC OF CHINA

To H. C. WIESS

HUMBLE OIL & REFINING COMPANY

ON behalf of the Chinese Government, it is my pleasure to thank you and the members of your organization for the way in which you cooperated in training those of my countrymen who were especially selected during the war to study technical methods of production in the United States.

Through the efforts of your Department of State and the China Institute in America, you, with other American businessmen, have made a contribution of far greater value than you perhaps realize toward helping us solve our vast reconstruction program. Furthermore, the friendships which have developed as a result of this program will do more than anything yet undertaken to further understanding and cooperation between our two countries.

Now that the wartime training program has come to an end, I most sincerely hope that some means may be found to continue this important work. China is in desperate need of men and women trained in modern technological methods and we look to America to aid us as we face the critical years ahead.

CHIANG KAI-SHEK,
President

January 27, 1947

The HUMBLE WAY

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Published every other month for employees and stockholders
HUMBLE OIL & REFINING COMPANY
P. O. BOX 2180, HOUSTON 1, TEXAS

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Art credits: Watercolors on front cover and Pages 14 and 15, Kenneth Harris; sketches on Pages 20, 21, 22, 23, Allen Kinsman; and back cover, Bill Walker.

Personnel Changes

THOMAS W. MOORE, for the past 12 years manager of industrial relations at Baytown refinery, on January 15 was named adviser in the newly created executive development program in Houston. He will also serve as supervisor of the training division of the Humble Companies.

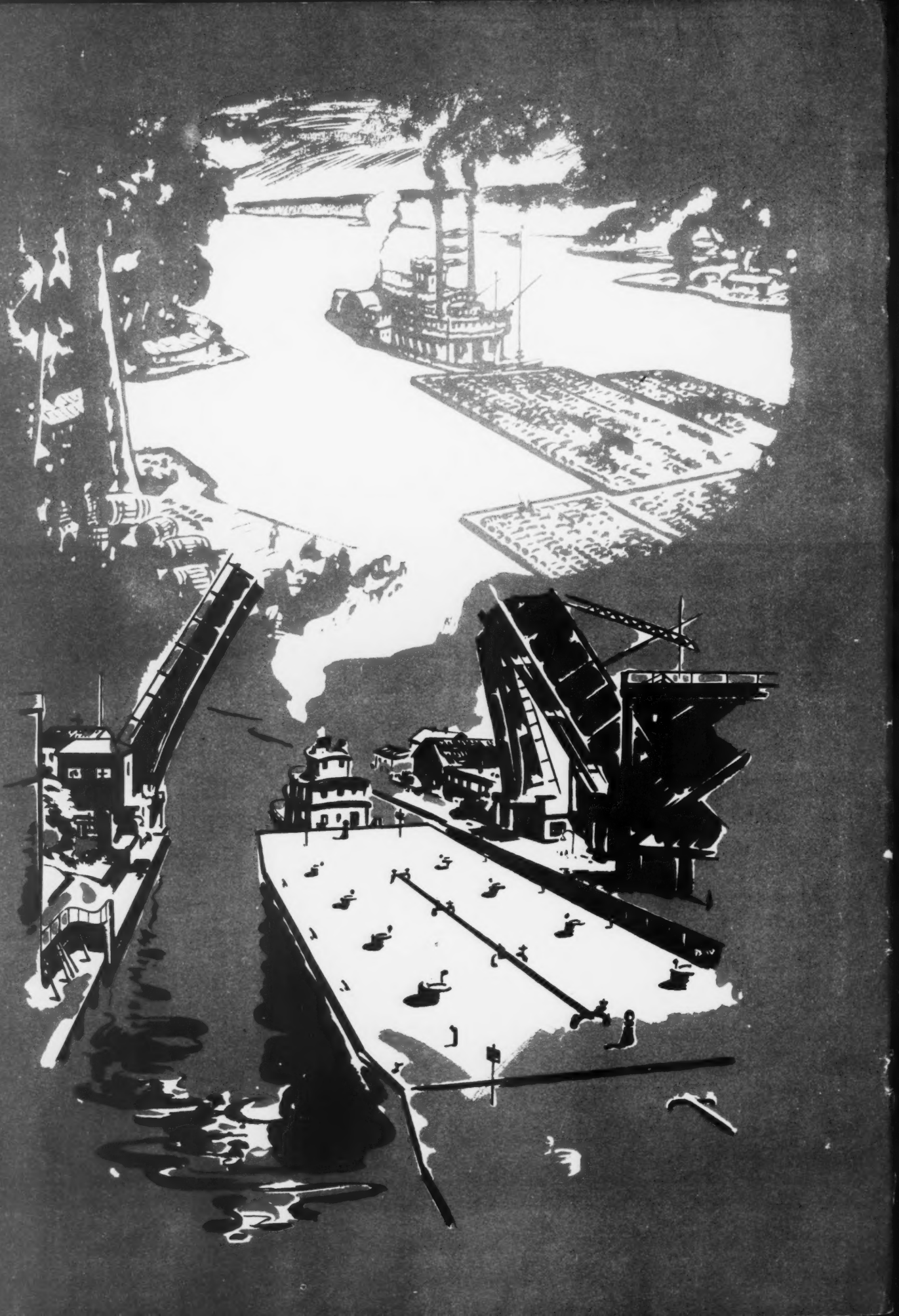
Succeeding Mr. Moore as industrial relations manager at Baytown is WILLIAM GRANT, JR., who for the past nine years has served as assistant chief safety engineer in Houston.

HARRY N. STAMPER, construction engineer for the Production department in Houston for the past 10 years, was appointed assistant chief civil engineer on January 1.

F. K. SAWYER, assistant chief clerk at Katy Cycling Plant, was transferred to the Pledger Natural Gas system at Danciger, as district chief clerk.

Deaths

HENRY O. GRICE, 44, wire chief at Lytle Station, HPL, died on December 18, 1946 . . . CARL L. BEENE, 47, tool mechanic at Baytown refinery, on December 25 . . . THOMAS D. WADE, 53, line walker at Anahuac Station, HPL, on December 25 . . . ROBERT S. AUSTIN, 39, laboratory tester at Baytown refinery, on December 30 . . . DAN F. NEEDHAM, 53, electrical foreman in the East Texas division of the production department, on January 1, 1947 . . . CLAUDE W. SCHROCK, SR., 58, lease pumper and gauger, Conroe Production, on January 6 . . . WESLEY M. HALTOM 25, burner at Baytown refinery, on January 8 . . . JAKE COKER, 24, roustabout at Scott-Hopper Production, on January 11 . . . JACK W. WALLS, 58, pipe fitter at Baytown refinery, on January 15 . . . and WILLIS I. GATLINE, JR., 37, fireman at Baytown refinery, on January 24.

Annuitants who have died since last publication date are: CHARLES HOWARD, janitor in the labor department at Baytown refinery until his retirement on January 30, 1943, died on December 14, 1946 . . . ELIJAH N. HULL, line rider at Cisco, HPL, until his retirement on February 28, 1943, on December 21 . . . and JAMES C. LANIER, SR., rotary driller at El Capitan, Production department, until his retirement on January 17, 1940, died on January 16.

PIPEFITTERS HOOK UP a gas-oil separator for a new well in the Permian Basin of West Texas. Well's production flows into separator; gas bubbles to top. Oil and gas go from separator to storage.